REMARKS

Claims 1-15 are pending in this application and are rejected. Claims 1-3, 5, 6, 8, 11 and 12 are herein amended. No new matter has been entered.

Claim Rejection - 35 U.S.C. §103

Claims 1-15 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,506,497 to Kennedy et al.

The Examiner notes that the claims as currently written do not require a degree of porosity of the resulting SOG film. The Examiner maintains that, even with the inclusion of the surfactants taught by Kennedy et al., the SOG of Kennedy et al. would be porous at least to a degree.

In claim 2, the Examiner asserts that it would have been obvious to have formed a thin second SOG film layer on top of a thin first SOG film layer instead of forming one thicker SOG coating film because splitting one step into two is an obvious and unpatentable variation.

The Examiner noted Applicants' previous argument that in the present invention the porous films constituting the laminate are put in layers while the holes in neighboring layers deviate from each other such that holes in the upper film have almost no communication with those in the lower film, resulting in almost no through hole in the multi-layered film.

For claims 4 and 10, the Examiner asserts that it would have been obvious to have used two anti-reflective coatings in combination, such as silicon oxynitride and the light-absorbing SOG film of the invention, with an expected result of improved anti-reflectance qualities over the use of one layer alone.

For claims 3 and 9, it is the Examiner's position that it would have further been obvious to have used a plurality of the anti-reflective coatings taught by Kennedy et al. (both silicon oxynitride and the absorbing SOG of the invention) with the exception of even further improved anti-reflectance qualities.

As to claims 5 and 11, the Examiner asserts that the irradiation step would inherently remove unreacted OH groups remaining in the SOG film.

As to claim 6, the Examiner notes that Kennedy et al. teaches that the exemplary heat treatment described in col. 7, lines 32-34 comprises two or three bake steps at temperatures between 80 °C and 300 °C for about one minute each. The Examiner asserts that heat treatment at a first lower temperature would perform evaporation and the second heat treatment at a second higher temperature would cover the inner walls of holes with hydrophobic moieties of surfactant because the materials and process steps are similar to those claimed by Applicant. The Examiner asserts that the prior art need not disclose the same purpose for a claimed method in order to establish its obviousness.

With respect to claims 7, the Examiner notes Applicant's argument that the temperature is less than 350 °C, which makes it difficult to obtain a porous film having a desired low relative dielectric constant. However, a particular dielectric constant is not claimed.

With respect to claims 13 and 14, the Examiner notes that Kennedy et al. lists exemplary surfactants but further notes that Kennedy et al. broadly states that surfactants in general are added to the coating solution, and that the exemplary surfactants are merely exemplary.

As to claim 13-14, Applicant argues that the surfactants in the invention are added for the purpose of forming SOG film, whereas the surfactants of the cited reference is for the purpose of decreasing the probability of formation of bubble film defects. The Examiner notes that a SOG

film is formed as a result of the process of Kennedy et al., and that the claimed surfactant are known to reduce surface tension of a coating liquid, similar to those listed as exemplary surfactants by Kennedy et al.

Applicants' Response to the Above Rejections

Applicants herein amend claims 1 and 8 to recite a level of porosity achieved by the present invention that is not achieved by the cited reference. Applicants refer to page 18, lines 2-14 and page 21, line 18 to page 22, line 10 of the specification. Applicants submit that even if the SOG film of the cited reference will necessarily be porous and the film will be porous at least to a degree as asserted and maintained by the Examiner, in the cited reference no mention is made of how to produce the porous SOG film and no level of porosity is disclosed or suggested. Applicants submit that the films of the cited reference are not porous in the sense that the inventive films are.

Applicants submit that the cited reference differs from the present invention, which relates to a method for preparing the SOG film having a void volume of not less than 50%. Even if the raw materials (for forming the SOG film) and process steps of the cited reference are in part similar to those claimed by the Applicant, Applicants submit that the reference has no intention of obtaining the porous film having the specified void volume by heat-treating the materials in the presence of the surfactant. Therefore, Applicants respectfully submit that claims 1 and 8 are not obvious from the cited reference.

With respect to claim 2, Applicants submit that even if it has been obvious to have formed a thin second SOG film on top of a thin first SOG film layer instead of forming one

thicker SOG coating film, amended claim 2 relates to the porous films having a specific structure which Applicants submit is not obvious from the cited reference.

According to amended claim 2, it becomes possible to inhibit any penetration of moisture such as water vapor through the surface of the porous film and to reduce the hygroscopicity of the porous film, as well as the resulting multilayered film has a low relative dielectric constant, whose dielectric constant never cause any change even when depositing another film on the surface of the multilayered porous SOG film (the interlayer insulating film) after forming the interlayer insulating flint Please refer to page 6, lines 3 - 9 of the specification.

Applicants further note that claim 2 depends on claim 1, which has been previous distinguished. Therefore, because claim 2 includes at least the limitations of claim 1, Applicants submit that claim 2 is similarly distinguished. Therefore, Applicants respectfully submit that claim 2 is unobvious from the cited reference due to the reasons as discussed herein and due to its relation to claim 1.

With respect to claims 3 and 9, Applicants note that the present invention does not relate to an anti-reflective film, in other words claims 3 and 9 do not concern the further improvement in the anti-reflectance qualities. Applicants note that in claims 3 and 9, the surface of the porous SOG film is capped with a hydrophobic film such as SiO_2, SiN_x, SiO_xN_y, film, whereby the moisture preparation and hygroscopicity of the multilayered film are reduced as compared with the porous film free of any capping film, and the relative dielectric constant thereof is not changed even when an additional film is deposited thereon in the subsequent semiconductor device- fabricating process. Further, after being capped as mentioned above, an additional porous SOG film-forming step is performed, whereby hygroscopicity from the SOG film can further be reduced. Such a structure is not described and suggested in the cited reference.

Applicants further note that claims 3 and 9 depend on claims 2 and 8, respectively. Therefore, Applicants further submit that claims 3 and 9 are not obvious from the cited reference due to the reasons as discussed herein and due to their relation to previously distinguished claims 2 and 8.

With respect to claims 4 and 10, Applicants note that as discussed above, the present invention does not relate to an anti-reflective film, in other words claims *4* and 10 do not concern the further improvement in the anti-reflectance qualities. In claims *4* and 10, the surface of the porous SOG film is capped with a hydrophobic film such as SiO_2, SiN_x, SiO_xN_y, film, whereby the moisture preparation and hygroscopicity of the multilayered film are reduced as compared with the porous film free of any capping film and the relative dielectric constant thereof is never changed even when an additional film is deposited thereon in the subsequent semiconductor device-fabricating process. Such a multilayered porous SOG film is not described and suggested in the cited reference.

Moreover, claims 4 and 10 depend on claims 1 and 8, respectively, which were previously distinguished. Therefore, Applicants respectfully submit that claims 4 and 10 are unobvious from the cited reference due to both the reasons as discussed herein and in connection with claims 1 and 8.

With respect to claims 5 and 11, Applicants admit that in the cited reference unreacted OH groups may be removed. However, Applicants note that the cited reference teaches only the SOG film for use as an anti-reflective layer which is applied under a photoresist layer and absorbs UV light transmitted through the photoresist. For this reason, the reference teaches addition of a compound for absorbing UV light for use in the reaction. By using such anti-reflective SOG film, the reflections of UV light from a silicon substrate are prevented and thus

exposure of the photoresist layer to ultraviolet radiation through mask is sharpened. In the cited reference, therefore, it is not necessary to actively remove the unreacted OH groups, because the addition of the absorbing compound will make it difficult to remove the unreacted OH groups.

Moreover, claims 5 and 11 depend on claims 1 and 8, respectively, and were previously distinguished. Therefore, Applicants respectfully submit that claims 5 and 11 are unobvious from the cited reference due to both the reasons as discussed herein and in connection with claims 1 and 8.

With respect to claim 6, Applicants note that the cited reference does not describe and suggest the two heat-treating steps and a porous SOG film having a specific void volume, as recited in amended claim 6.

Moreover, claim 6 depends on claim 1, which was previously distinguished. Therefore, Applicants respectfully submit that claim 6 is unobvious from the cited reference due to both the reasons as discussed herein and in connection with claim 1.

With respect to claims 7 and 12, Applicants note that the cited reference does not describe and suggest the two heat-treating steps, in particular the claimed temperatures ranging from 350°C to 450°C, which make it possible to form a large number of holes or voids having a void volume of not less than about 50%, as disclosed in the specification at page 21, line 18 to page 22, line 10 thereof.

Moreover, claims 7 and 12 depend on claims 6 and 8, respectively, which have been previously distinguished. Therefore, Applicants respectfully submit that claims 7 and 12 are unobvious from the cited reference due to both the reasons as discussed herein and in connection with claims 6 and 8.

With respect to claims 13 and 14, Applicants note that they depend on any of claims 1 to 12 and any of claims 1 to 13, respectively, which have been previously distinguished. Therefore, Applicants respectfully submit that claims 13 and 14 are unobvious from the cited reference due to the reasons as discussed herein and in connection with claims 1-13.

With respect to claim 15, as noted by the Examiner the cited reference does not teach the respective amounts of water, acid and surfactant in the coating composition. In this contrast, in the present invention the respective amounts of water, acid or alkali, and surfactant are critical as disclosed at page 10, lines 21- 28 of the specification.

Moreover, Applicants note that claim 15 depends on any of claims 1-14, which have been previously distinguished. Therefore, Applicants respectfully submit that claim 15 is not obvious from the cited reference due both to the reasons as discussed herein and in connection with claims 1-14.

Applicants generally submit that the Examiner's statement is merely a use of hindsight growing out of Applicants' teaching in connection with the porous SOG film, film-forming materials and process steps of the present invention, which are in part similar to those taught by the cited reference. Under such circumstances, Applicants respectfully submit that Kennedy et al. does not render claims 1-15 obvious.

In view of the aforementioned amendments and accompanying remarks, Applicants respectfully submit that that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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